Supplementary figure legends:

Figure S1: (A-B)The result of qRT-PCR that used to detect the expression of cytokines secreted by TAMs after treatment with GSK3β inhibitor or NF-κB inhibitor. (C-D) The expression of related proteins in TAMs added GSK3β inhibitor or PBS. *$p<0.05$, **$p < 0.01$, ***$p < 0.001$. ns indicated no significant different.

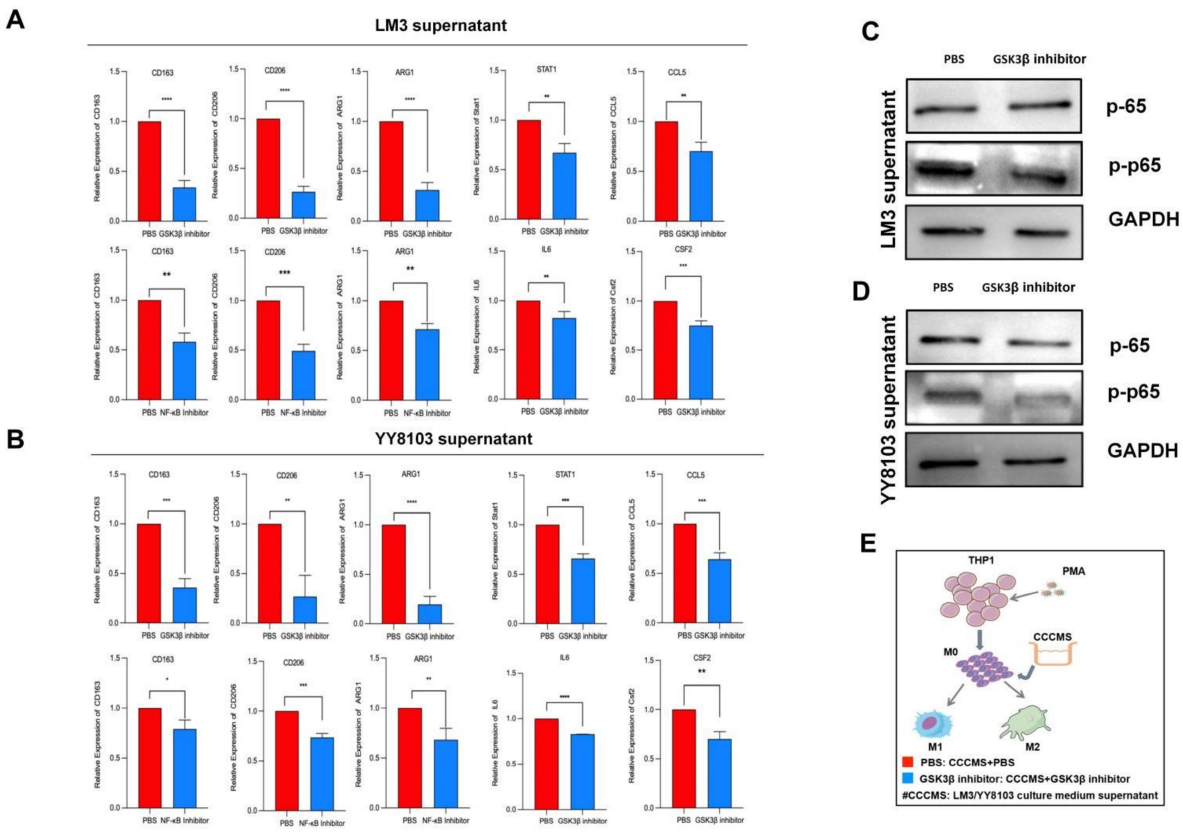


Figure S2: (A) Results of expression level of PD-L1 in GSK3β inhibitor and PBS group of TAMs. (B)Co-immunoprecipitation assays showed an interaction between GSK3β and PD-L1 in 293T cell. Input was as a control.

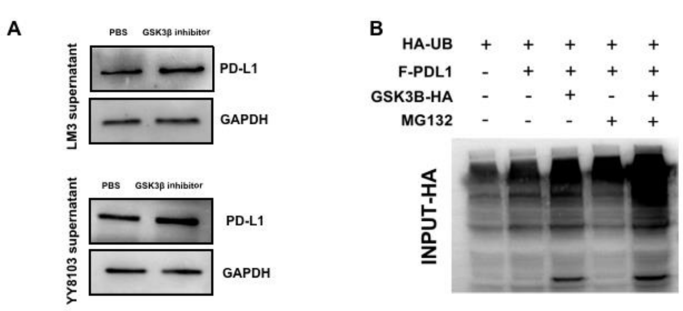


Figure S3: Correlations between GSK3β expression and act-CD8, PDCD1, TIGIT, CTLA4.

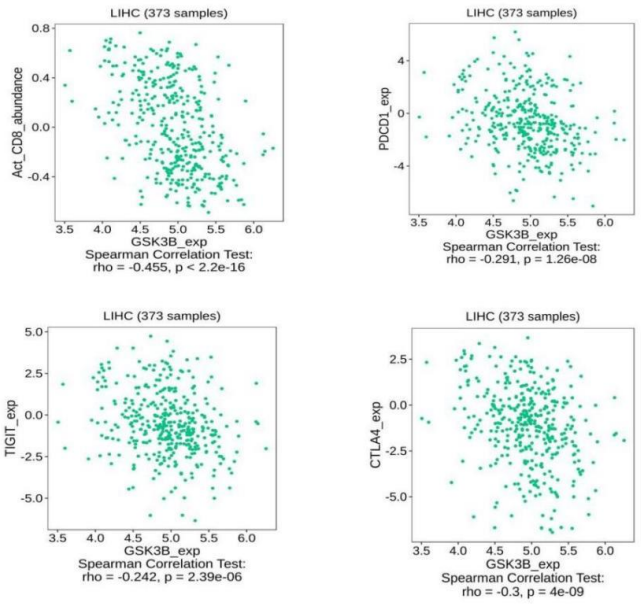


Figure S4: The expression of cell clustering marker genes via mass cytometry of mice tumor sample.

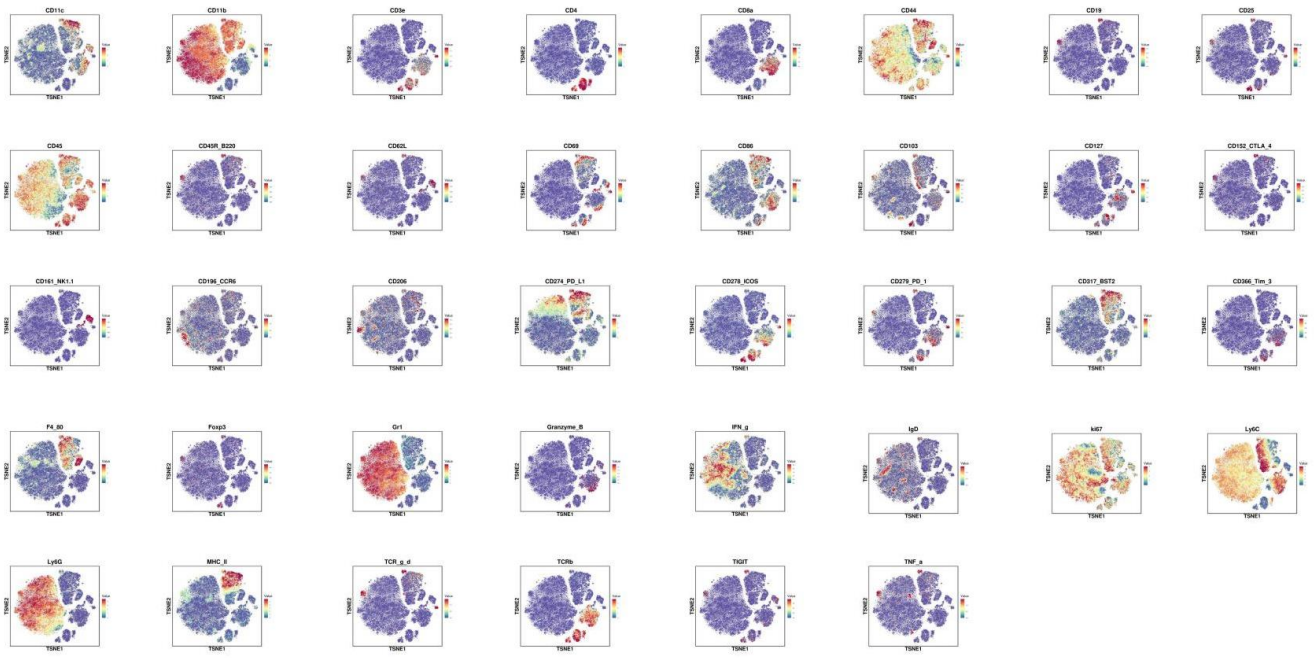


Figure S5: Mass spectrometry process.

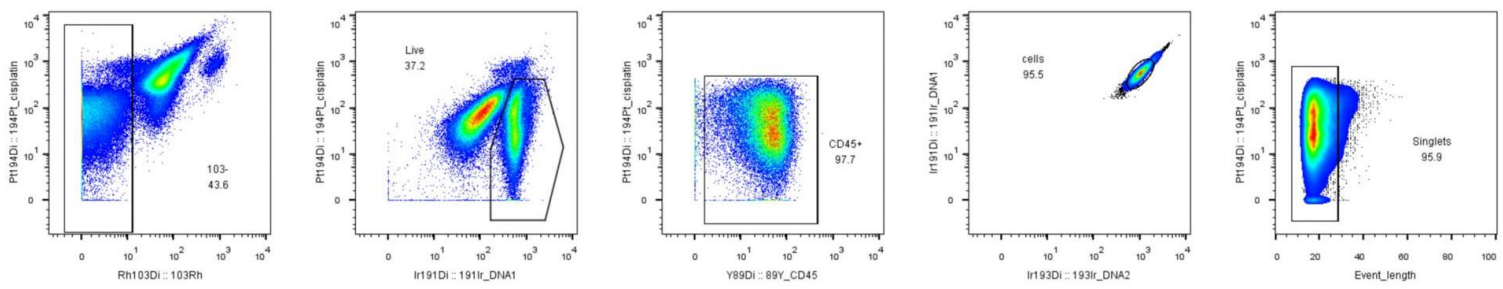


Figure S6 The expression of cell clustering marker genes via mass cytometry of human samples.

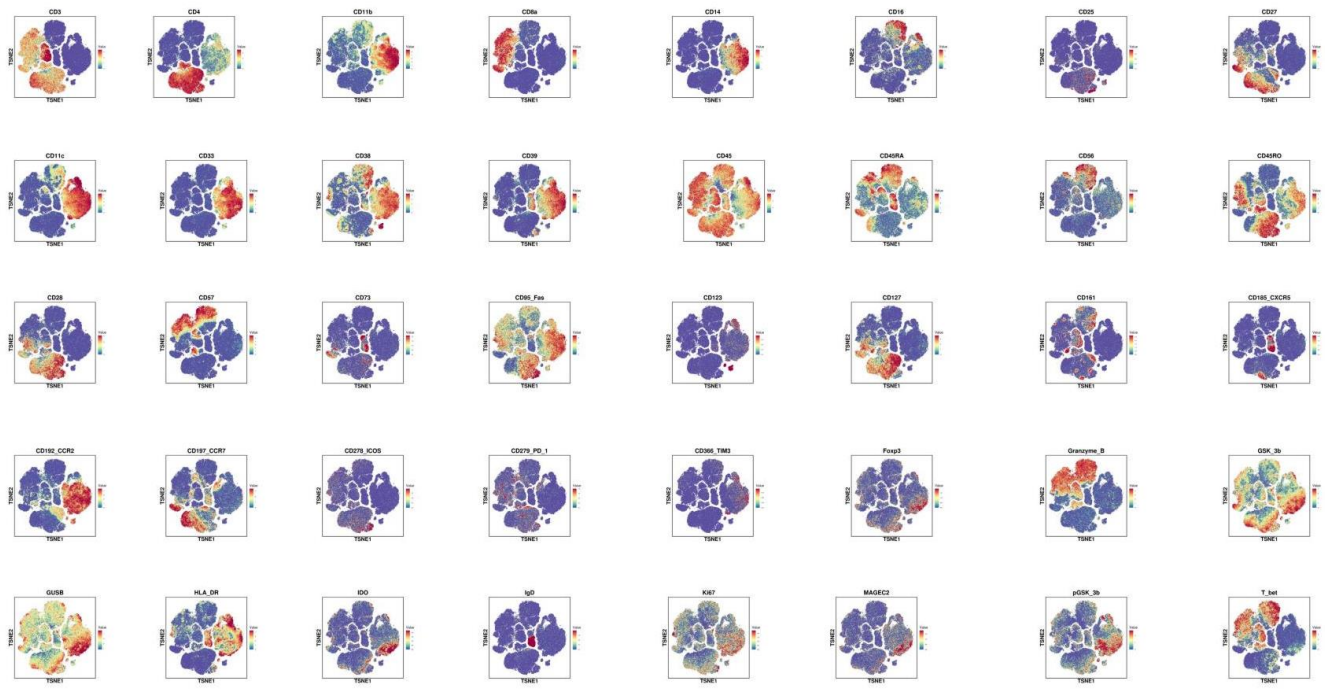
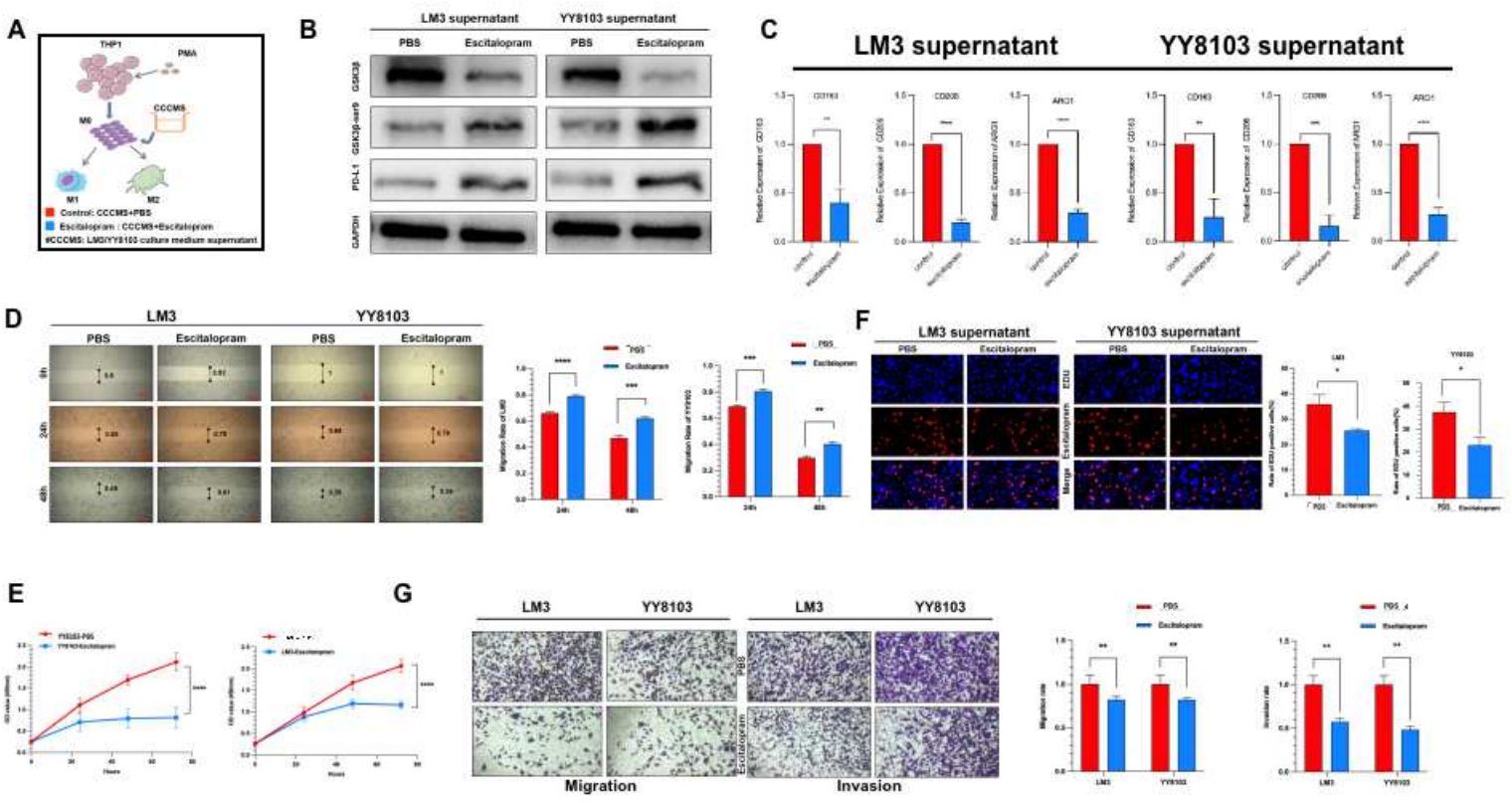


Figure S7: Escitalopram significantly up-regulated PD-L1 expression by reducing GSK3β in TAMs. Escitalopram-treated TAM could inhibit the proliferation, invasion and migration of human HCC cells.(A) Schematic showing the process of inducing the M2 phenotype TAMs. (B) The expression of related proteins in TAMs treated with escitalopram or PBS. (C) The mRNA expression of M2 phenotype TAM-related surface markers after add escitalopram. (D)Wound healing assays were used to assess cell migration of HCC cells after cultured with TAM treated with escitalopram. (E) The growth curves of HCC cells were plotted after cultured with TAMs treated with escitalopram based on CCK-8 assays. (F) EdU assays were performed to assess cell proliferation of HCC-LM3 and YY8103 cell lines cultured with TAMs treated with escitalopram. (G)Transwell experiment was adopted to assess cell invasion of HCC cells incubated with TAMs treated with escitalopram. *$p<0.05$, **$p < 0.01$, ***$p < 0.001$, ****$p < 0.0001$.



Supplementary Table S1. Primer sequences in this study

Primer		Sequence (5'-3')
human-CD163	Forward primer	TTTTGTCAACCAGTTCTCTTGGA

	Reverse primer	AGCCATTATTACACGTTCC
human-CD206	Forward primer	GCTAAATGGGAAAATCTGGAATGTT
	Reverse primer	CGATGGTGTGGATACTTGTGAGG
human-ARG1	Forward primer	GTGGAAACTTGCATGGACAAC
	Reverse primer	AATCCTGGCACATCGGGAATC
human-IL6	Forward primer	AGGATACCACTCCCAACAGACCT
	Reverse primer	CAAGTGCATCATCGTTGTTCATAC
human-CSF2	Forward primer	GCTGTCTACGTCGGGATGC
	Reverse primer	GACCATGCGATCCACCTCTC
human-STAT1	Forward primer	CAGCTTGACTCAAAATTCCTGGA
	Reverse primer	TGAAGATTACGCTTGCTTTTCCT
human-CCL5	Forward primer	CGTGCCCACATCAAGGAG
	Reverse primer	GGACAAGAGCAAGCAGAAAC
human-GAPDH	Forward primer	GCATGGCCTTCCGTGTTC
	Reverse primer	GATGTCATCATACTTGGCAGGTTT